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KNOW YOUR NATIONAL FORESTS IN CALIFORNIA

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KNOW YOUR NATIONAL FORESTS IN CALIFORNIA

A STORY OF CONSERVATION
THROUGH WISE USE X

By

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A limited number of copies may be obtained free from
U. S. Department of Agriculture, Forest Service,
630 Sansome Street, San Francisco 11, California

WASHINGTON, D. C.

JUNE 1949

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 15 cents

FOREWORD

This booklet explains the purposes and uses of the national forests of California, in nontechnical language. The concept of conservation as wise use is stressed.

Teachers will find the material can be used as a supplement to related work in natural science, general science, biology, or social studies, or as a separate unit. It may be of value for assignment as an independent study to faster working pupils. One week should be an adequate time allowance.

Problems have been grouped at convenient points. The key words which accompany the problems should be defined and understood. The review on page 36 offers suggestions for a convenient summary and test. Teaching aids are given in the appendix.

Women's clubs and others will find the booklet useful for meetings or panel discussions on conservation.

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INTRODUCING OUR NATIONAL FORESTS



F-357127

We have a feeling for this heritage of ours—for our forests, for our mountains. We like to hear the rush of mountain streams, and to feel the cool shade of the forest on a hot day. We like to smell pine needles fragrant under the sun, and we like to see the trees of the forest covering the hillsides with green. We know that forests are not only useful, but necessary to our daily living: They yield water; they make life comfortable by furnishing lumber for homes; they provide forage for sheep and cattle to eat; they provide homes for wild animals and birds and fish. We know that forests are fun; that we can hike and camp and picnic in the woods.

In this booklet, we are going to learn about the uses of the forest. We are going to learn about the national forests of California in particular and what they do for our people. Most people agree that “conservation” is good. But fewer people really know what it means, what we must conserve, or how to

go about it. So we will learn the meaning of conservation and what we can do to practice it.

We may as well begin by clearing up the confusion in the minds of many people by distinguishing between the various types of public forests and parks in California. How many people ever notice the signs at the entrance to such areas? Do you?

National Parks and Monuments are administered¹ by the National Park Service of the United States Department of the Interior. They are areas of scenic, historical, or scientific interest set aside for the enjoyment of the people. They are usually left in a natural condition except for necessary tourist accommodations. Such activities as timber cutting and grazing are not permitted.

NATIONAL PARKS AND MONUMENTS IN CALIFORNIA

Parks:	Monuments—Continued
Yosemite	Devil Postpile
Kings Canyon	Death Valley
Sequoia	Channel Islands
Lassen Volcanic	Cabrillo
Monuments:	Joshua Tree
Lava Beds	Pinnacles
Muir Woods	

State parks, beaches, and historic monuments are administered by the Division of Beaches and Parks of the California Department of Natural Resources. There are 88 of them—sandy beaches, rocky coast lines, lakes and lagoons, mountains, deserts, and timber areas, including groves of redwoods.

State forests are administered by the Division of Forestry of the California Department of Natural Resources. There are 3 of them, totaling about 60,000 acres. The Division of Forestry also protects from fire about 24 million acres of privately owned lands covered with forest and brush. These areas lie outside the national forests and national parks.

¹ *Administer:* to manage; conduct; superintend.

STATE PARKS, BEACHES, AND HISTORIC MONUMENTS

Parks:	Beaches—Continued
McArthur-Burney Falls	Sunset
Humboldt Redwood	Carpinteria
Mount Tamalpais	Van Damme
Big Basin	Historic monuments:
Point Lobos	Donner
Anza Desert	Marshall
Mount San Jacinto	Fort Ross
Beaches:	Fort Tejon
Santa Monica	San Juan Bautista
Manhattan	Monterey
Alamitos	Sonoma Mission
Doheny	And many others

This booklet deals chiefly with *national forests*. National forests are administered by the Forest Service of the United States Department of Agriculture, under a policy of multiple use. Multiple use means that it is possible for timber to be cut, cattle to be grazed, and recreation to be enjoyed, all in the same area. For example, a mountain meadow may provide grass for cattle; a location for a boys' or girls' camp; a stream for fishing, swimming, irrigation, or electric power; and the surrounding timber may be cut, with care, for lumber. The purpose is to have each acre of national-forest land contribute the greatest good to the greatest number in the long run, whatever that good may be.

A national forest contains about 1 million acres under the administration of a forest supervisor. There are 18 national forests in California. Each is divided into about 5 ranger districts. A district is administered by a district forest ranger.

Examine the map on page 39 in the appendix. It shows that most of the national-forest land is in the West—in the Rocky Mountain and Pacific Coast States. There are about 178 million acres in national forests of the United States, an area $1\frac{3}{4}$ times the size of California. For convenience in administration, the country has been divided into ten national forest regions, of which California is one.

THE NATIONAL FORESTS OF THE CALIFORNIA REGION, SHOWING LOCATION OF FOREST SUPERVISORS' OFFICES



Dots on the map show location of headquarters. San Francisco is headquarters for the California Region.

California has an area of about 100 million acres, of which nearly 20 million acres are in national forests—nearly 1 acre in every 5. That is a lot of land. What happens to it should be *your* concern.

The purposes and organization of the various agencies which

administer public forests and parks are shown on page 41 of the appendix.

FORESTS ARE FUN

Recreation is one of the most important “industries” in California. Along the seacoast, in the redwoods, in the mountains, in the desert, we find resorts and playgrounds. California is one of the greatest recreation centers in the Nation, but many of our recreation areas are overcrowded. How to provide for the recreation needs of the large population within the State, and of millions of out-of-State visitors presents a problem in planning. The California Recreation Commission, created in 1947, attempts to help solve this problem.

The 18 national forests of California are visited by more than 4 million people each year, who stop in the mountains to fish, hunt, swim, ride, hike, and camp out.



F-418769

Skiing brings thousands of visitors to the forests in winter and makes them year-round playgrounds. There are 50 popular winter-sports areas within the national forests.

WELL-KNOWN NATIONAL-FOREST RECREATION
AND SCENIC CENTERS IN CALIFORNIA

Klamath River	Mammoth Lakes region
Mount Shasta	Mount Whitney
Salmon-Trinity Alps	Santa Ynez River
Yolla Bolly Mountains	Mount Pinos
Lake Almanor	Angeles Crest Highway
Feather River	Mount Wilson Observatory
Lakes Basin	Big Pines
Lake Tahoe region	Crystal Lake
Pinecrest	Lake Arrowhead
Silver Lake	Big Bear Lake
Bass Lake	Rim-of-the-World Drive
Huntington Lake	Palomar Observatory
Kern River	Laguna Mountain area

Each year over 16 million people drive through the national forests of California on business or to enjoy the scenery. To picture this, imagine a single line of cars stretching from New York to the Pacific coast.

Portions of certain national forests, called *wilderness areas*, have been preserved in a wild condition for the enjoyment of people who want to live close to nature. No construction of roads, summer homes, or resorts is allowed. These are areas of rough mountains and forests, rich in scenic beauty, distant from roads, where people can hike, take pack trips, fish, and camp out in tents. But only a small part of the national forests, about 1½ million acres in California, or 8 percent, has been set aside for this purpose. Locations are shown in the list on page 42 in the appendix.

Fifteen of the national forests of California—all except Tahoe, Sequoia, and Plumas—have at least one wilderness area.

On most of the 92 percent of national-forest land not set aside in wilderness areas, continuous crops of timber are grown and harvested, cattle and sheep are grazed, roads are built, and recreation developed. Recreational resources are developed for the fullest use of the general public and not for the exclusive use of individuals or small groups.



F-437399

The Forest Service has constructed over 10,000 family camp or picnic units in California such as the one shown in the above photograph. Each unit consists of stove, table, car parking space, and a place for a tent. There are roads, water supplies, and sanitation conveniences at all improved camp grounds. A small charge is made at some camp grounds; in most cases, however, there is no charge.

Youth camps, municipal recreation camps, summer homes, and resorts are permitted in areas especially planned for that purpose. There is a small rental for such uses. Simple design, quiet colors, and rustic appearance are favored.

In the four national forests of southern California, camping or picnicking outside improved and posted camp grounds is prohibited because of fire hazard. In the other forests it is allowed, with a few exceptions. In periods of high fire danger, parts or all of the national forests may be posted or closed to public use and travel except under special permit. Smoking is prohibited except in camp, at places of habitation, and in special posted areas. The local forest ranger provides rules for camping and fire prevention.

KEY WORDS

National forest

Multiple-use policy of land management

Wilderness areas

PROBLEMS

1. Examine the map on page 4. What is the name of the national forest nearest your home, and where is its headquarters?
2. What other national forests are important to your community? In what ways?
3. How are wilderness areas different from other areas of national-forest land?
4. Examine the map on page 39 of the appendix. What six States have large areas of national-forest land? Name six States which have no national forests.
5. What are the differences between national forests and national parks?

FORESTS PROVIDE A HOME FOR FISH, BIRDS, AND WILD ANIMALS

Many of the 4 million people who stop and visit the national forests of California each year are attracted because of the opportunities for fishing and hunting.



F-437404

Most of the trout streams and lakes of the State are located within national forests. The principal kinds of fish in national-forest waters are the various species of trout: rainbow, brook, golden, Loch Leven, cutthroat, and steelhead. Salmon are also found.

In some national forests, small rearing ponds are located on streams. In them tiny fish from a hatchery are released in the spring, allowed to grow during the summer, and released into the creek in the fall when they are large enough to live in fast water. Sometimes trout from hatcheries are "planted," or released, directly into lakes or streams without being allowed to grow in a rearing pond. These fish are usually transported to the point of release on trucks, in cans, or special aerated tanks.

The rules and regulations concerning hunting and fishing on national forests are made and enforced by the Division of Fish and Game, California Department of Natural Resources. This division also determines the fees that will be charged for this privilege. But both State and Forest Service work together in deciding what needs to be done to help produce good “crops” of fish, birds, and wild animals. They try to improve the environment, or habitat, which provides food, shelter, and protection against natural enemies.



F-413330

Explorers in a national forest.

Two of the more important problems facing the State and the Forest Service are: How to furnish satisfactory hunting and fishing to increasing numbers of sportsmen without reducing limits or seasons too severely; and how to provide enough range all year long for the big game herds.

CENSUS ESTIMATES OF WILD ANIMALS IN NATIONAL FORESTS OF CALIFORNIA

Deer.....	422, 000	Bears	16, 000
Mountain sheep.....	500	Antelopes.....	2, 700
Elk	120	Coyotes.....	88, 000
Bobcats.....	37, 000	Mountain lions.....	1, 200

In nearly all of their protection work, the State game wardens are assisted by forest rangers, who usually have been appointed to serve also as deputy game wardens. Law enforcement, however, is not the principal job of the Forest Service in wildlife management. The forest ranger's part is to manage the forest land in his district to provide food, shelter, and good living conditions (a good habitat) for birds, fish, and animals. Because certain kinds of plants are especially good for these purposes, he may start them growing. The ranger manages the forest for wildlife production, as well as for the grazing of livestock, timber cutting, and recreation. If national forests were managed for one crop alone such as timber or wildlife, the job would be much easier!

KINDS OF FUR-BEARING ANIMALS IN NATIONAL FORESTS

Fox	Beaver	Marten
Mink	Rabbit	Skunk
Badger	Weasel	Fisher
Wolverine	Muskrat	Ring-tailed cat
Otter	Opossum	Raccoon

Sometimes refuges, sanctuaries, or special protected areas are set aside where the mammals or birds can be allowed to increase, when numbers become too low. The Sisquoc Condor Sanctuary in Los Padres National Forest is a good example. This area was set aside to help the California condor in its fight for existence.

GAME BIRDS IN NATIONAL FORESTS

Ducks	Quail
Pheasants	Doves
Geese	

KEY WORDS

Improving the habitat
Refuges and sanctuaries

PROBLEMS

(Answers are not in the text)

1. How will the quail population be affected if brush is burned off a large area?
2. If large areas are logged destructively, cutting all the large trees and breaking many of the very small ones, how will deer living in the forest be affected?
3. What is the effect on fish of dumping mining or factory waste or sewage into streams? How does a forest fire along a stream affect the fishing?
4. Why isn't stocking with young fish or game birds by itself a satisfactory method of improving fishing or hunting? What else should be done?

FORESTS FURNISH PASTURE FOR LIVESTOCK

Approximately 126,000 cattle, 133,000 sheep, and a few horses and goats are permitted each year to obtain forage² from the national forests of California. A charge is made for this grazing.

Grazing should begin in the spring only after the forage plants have a good start in growth. Continued too-early grazing makes the plants weaker each year until they finally die out. Overcrowding with too many animals on the range will also cause plants to die out, especially the better kinds. When the grass is killed, worthless weeds and bare ground take its place.

Without a plant cover to hold the topsoil³ in place it may be washed off or blown away. Such loss of soil is called *erosion*.

² *Forage*: plants eaten for food by wild or domestic animals.

³ *Topsoil*: the top layer of soil proper. In it is the food zone from which roots take up plant food.



F-235231

Cattle harvest the forage crop on meadows and in the open forests of the foothills.

The subsoil (undersoil) is less fertile and less productive. The only plants that will grow on it are usually worthless weeds.

If range is damaged by loss of topsoil, some, or perhaps all, of the stock may have to be removed to permit the land to recover. To keep the soil productive, the range must be used wisely. That means keeping off stock in the spring until plant growth is well started, and stocking with cattle or sheep in numbers which will permit the plants to keep their strength and vigor after they have been cropped.

About half of the plant growth must be left uneaten at the end of the year if the range is to be kept in good condition. When range is damaged, forage plants become small and weak and scattered. On good range, the same kinds of plants grow large and strong and close together. On damaged range there is usually considerable bare ground, with small stones and

pebbles visible, showing that the fine topsoil has been washed away (eroded).

In the valleys and mountains of California, brush and dry grass on cattle and sheep range are often set afire and burned off. Some people think this makes better grazing. It is true



F-206444

Sheep graze at higher elevations, often above timber line.

that certain kinds of “nonsprouting” brush may be killed out by proper use of fire. More often setting fires results in the poorer grasses—those with low food value—replacing the better grasses. Plants undesirable on the range usually prefer “raw” soil—soil that has been burned over or exposed by loss of topsoil. Before setting fires to “improve” grazing, the advice of officials such as farm advisors or State or Federal rangers should be obtained.

Good plants are good soil builders. Through action of their roots, and with what fertilizer they add when they decay, they improve the soil. Burning and erosion destroy the nutritious

elements in topsoil. The poorer plants which come in after fire, or with overgrazing, take more out of the soil than they put back. When soil is laid bare to the sun and to the rain, it dries out, and washes away because there is not a good cover of plants to hold it.

RULES FOR WISE USE OF RANGE

Don't overcrowd with livestock.

Don't allow livestock to use range too early or too late in the season.

Don't burn the range unless an advisor recommends it.

Forest rangers work with stockmen to see that national-forest ranges are used in ways which will provide plenty of forage. Livestock on mountain ranges cannot be turned loose to go where they wish when they wish. So cattle are taken care of by riders (cowboys), and sheep are watched over by herders. These men keep the stock within their allotted area and seek to obtain best use of the feed. Good range management means using forage wisely.



F-307193

In the photograph on page 15, there is excellent range on the left side of the fence and poor range on the right side. Overgrazed range is like a sick person and needs treatment. It may be necessary to keep off some or all of the livestock for several years. Or a later start for spring grazing may do the trick. Then if the range does not improve naturally, reseeding with grasses may be necessary.

KEY WORDS

Topsoil
Forage
Erosion
Range management

PROBLEMS

1. What are the signs that show a pasture has been used too heavily?
2. See if you can figure out why reseeding alone, without reducing numbers or shortening the grazing season is not the complete cure for injured range. (This is similar to question 4, page 12.)
3. What are some of the things to be done if you are trying to use range wisely?

FORESTS PRODUCE TIMBER

In the United States, there are almost 2 billion acres of land. About 461 million acres of this are commercial forest land—land capable of growing timber in good quantity and quality if used wisely. Another 163 million acres are noncommercial forest land, an example being the chaparral land in southern California. There the chief value of the trees and other plants is to protect watersheds. Adding 461 and 163 million acres together, we find that almost one-third of the total land area of the United States is forest.

The area of California is approximately 100 million acres. About 17 million acres are private and Government land where timber can be grown for commercial use. So about one-sixth of the area of the State is timber-forest land.

National forests are important timber-producing areas.

AMOUNT OF STANDING TIMBER IN THE NATIONAL FORESTS OF CALIFORNIA

Kind (species)	Billion board feet
Ponderosa pine	25
Fir	20
Douglas-fir	16
Sugar pine	10
Incense-cedar	3
Redwood	1
Total	75

The table shows that the timber now growing in the national forests of California is sufficient to build houses for about 30 million people, or three times the present population. This is about 40 percent of the total timber stand in the State.

In the United States as a whole, about 275 board feet of lumber are used yearly per person, but in California each of us uses about 560 board feet per year. (A *board foot* is the amount of lumber in a board one foot long, one foot wide, and one inch thick.) Why do Californians use twice as much lumber as the average person in the rest of the country? The explanation is twofold: (1) There is a growing population and growing business. New homes, new factories, new stores, require lumber; even construction with concrete requires “forms” of wood into which the concrete is poured. (2) A great amount of lumber is required for the crates and boxes in which the vegetable and fruit crops are packed.



F-437802

A log pond and sawmill in northern California.

California produces only about two-thirds of the lumber it uses. Lumber is shipped in from Washington, Oregon, and the Southern States to supply the demand for certain kinds. On the other hand, about one-third of California's lumber production of other kinds is shipped to the East.

Timber production in California is shown in the following table:

Year	State production (million board feet)
1948.....	¹ 3,575
1946.....	2,680
1944.....	2,470
1932.....	680
1926.....	2,190

¹ Estimate.

National forests furnish about one-fifth of the total production. Lassen and Plumas National Forests are well in the lead over other forests in sales of timber to lumbermen. Find these forests on the map on page 4. The four southern California forests sell practically no timber, since they are mostly covered with shrubby growth (chaparral). They are chiefly valuable for watershed protection, flood control, and recreation. (A *watershed* is an area where rain falls or snow melts to supply water for a stream or lake.) All other national forests in California produce some timber. The heaviest production is in the northern Sierra Nevada. There is lighter production in the southern Sierra Nevada, and still less in the national forests of northwestern California.

In California it takes about 100 years for a tree to grow to saw-timber size. (Saw timber means timber which is sawed



F-437876

Marking a tree to be cut, using a paint gun. This is a first step in good forestry practice.

in manufacture; for example, timber sawed into lumber. Timber not sawed may be sold "in the round," like fence posts, or split out, like grape stakes.) If everything is cut off the land at once, we must wait about 100 years until a complete new forest grows before we can again cut timber on the same area. However, if healthy young trees are left in the first cutting, they will reach saw-timber size in less than 100 years, and another profitable cutting can be made.

It is important to leave these young fast-growing trees so that we can harvest a timber crop from an area over and over again. We harvest a crop of vegetables or fruit or grass each year; with



F-88111

This forest was cut under good logging practice. The soil is protected and will not wash away. Fast-growing trees have been left for seed and for a later harvest. Small trees were not destroyed.

trees, the crop can be harvested perhaps once every 25 years. If we keep fire out and provide for seed and young trees, we can continue producing timber crops from a piece of land year after year.

Many communities depend upon logging or sawmills for their existence. As long as the timber holds out, these towns will continue to prosper. Men will work in the woods or in the mill, and raise families in prosperity. There will be churches, and stores, and banks, and schools, and homes. In any forest large enough to support a community, the cutting of timber can go on forever if it is planned properly. That is called *sustained-yield cutting*.

Unfortunately, timber land is not always treated in this way. Trees are often cut without selecting some to be saved, or they



F-237458

This forest was cut under bad logging practice. There are no trees left for seed or for the next cut. The soil is left unprotected. Wildlife and watershed values have been destroyed.

are cut high on the stump, wasting the best lumber. Young trees may be broken off because of carelessness in felling large trees, and other young growth ruined when logs are carelessly taken out of the woods with tractors or drag lines. Forest fires may start and spread through the area, completing the damage.

What happens to a community when the timber is gone? The logging camps and the sawmill move out, the people leave, and the town for all practical purposes is dead. Have you seen one of the “ghost towns” that were left after logging or mining had closed down?

Natural resources like forests and grass and fish and game which “keep growing” do not have to be locked up to conserve them. But—they do have to be used wisely.

KEY WORDS

Marking timber
Timber crop
Sustained-yield cutting

PROBLEMS

1. How may timber be treated like a crop?
2. Name four good forestry practices. (Example: Select certain trees to be saved.)
3. Name four indications of bad logging practice. (Example: No plan for leaving certain trees.)
4. What species of timber grows in California in the largest amount? How does it compare with the amount of standing redwood timber?
5. What is the difference between commercial and noncommercial forest land? In what part of California is most of the forest land noncommercial? What are its chief values?

FORESTS ARE WATERSHEDS

Forest lands act as storehouses for water. Of course, water is used in many ways—for drinking and bathing; for washing clothes and dishes; for navigation; for recreation; for irrigation; in factories; and for generating electricity.

Water is the most important resource of the forests of California. The moist winds from the Pacific Ocean blow inland and are cooled when they meet the mountains. The moisture condenses when it is cooled, and falls as rain or snow. For this



Water travels from clouds to earth and back to clouds.

reason, forest areas in the mountains receive more moisture than the dry central valleys. The snow which falls in the High Sierra is important because it melts in the spring to furnish water for many communities and farms. The great snow fields of the Sierra Nevada receive as much as 600 inches of snowfall in a winter, which settles or “packs” to about 250 inches in some places.



F-376787

A source of water for farms and cities in the valleys below.

The forests of the Sierra Nevada watersheds provide a water supply for:

Hetch Hetchy Reservoir—which supplies San Francisco and some peninsula cities.

Pardee Reservoir—which supplies Oakland and other East Bay cities.

Owens River reservoirs—which supply part of the water for Los Angeles.

Central Valley Project reservoirs—which supply water for irrigating the San Joaquin and Sacramento Valleys.

Many local reservoirs.

Underground water for pumping.

Other important watershed areas in California are the forests of the Coast Range and those of southern California in the vicinity of Los Angeles, San Bernardino, and San Diego. All together, 45 percent (45 million acres) of California is watershed land—land covered with forest and brush that protects the source of our water supplies.

The national forests of Colorado, Utah, and Wyoming are part of the Colorado River watershed, from which cities belonging to the Southern California Metropolitan Water District obtain their water, as well as the Imperial and Coachella Valleys.

It is important to know how much snow falls in the forests because so much depends upon snow as a source of water. Measurements of snow are made at many strategic points in California through the winter and spring. Sometimes forest rangers help take these measurements, under the direction of the State Division of Water Resources. They travel to snow

fields, usually on skis, and plunge a metal tube through the snow to solid ground. The weight of the snow in the tube gives the percentage of water in the snow. Irrigation districts, farmers, and city water users alike are interested in reports of the "snow harvest."

KEY WORDS

Watershed
Reservoirs
"Snow harvest"

PROBLEMS

1. Examine the map of national forests on page 4 and name the forests of the Sierra Nevada supplying water for the Central Valley Project, which will irrigate agricultural croplands from Redding to Bakersfield.
2. Determine the source of water used in your community. Find out what reservoirs, mountains, and forests are part of your water system. Learn how your community obtains, distributes, and purifies its water. Then write a short report entitled "Forest to Faucet."
3. Find out how sewage and factory waste from your community are disposed of. Do you consider the method satisfactory? Why?

PROTECTING THE FOREST

Fire, disease, and insects damage our forests. A disease known as *blister rust* attacks the "white" or five-needle pines, of which California sugar pine is one. Control of this disease has been under way for many years. It is accomplished by removing currant and gooseberry bushes upon which the disease lives before it reaches the pines. Insects sometimes break out in epidemics* which sweep across forests. However, there is

great year-after-year loss from less violent attacks of both insects and disease, probably exceeding the loss by fire, although less spectacular.

Fire is still a great destroyer. From 1825, when the Miramichi fire swept over 3 million acres of Maine and New Brunswick, to the Ojai fire in 1948, which covered 25,000 acres in California, we have had these disasters. But far more costly have been the year-after-year losses from thousands of smaller fires.

Over 20 million acres are burned every year in the United States. If all this acreage were in California the whole State would be burned over in 5 years. This is a staggering waste



F-342637

One man caused this fire: he tossed away a burning cigarette.

for today, and for tomorrow, too. There are about 4,000 fires each year in California. They burn over 450,000 acres of timber, brush and range. That is the equivalent of a strip 2 miles wide extending from San Francisco to Los Angeles burned every year.

An amazing fact about these fires is that only two out of every ten in California are due to natural causes, chiefly lightning. Eight out of ten are caused by people. One of the eight is intentionally set and the other seven are due to carelessness or ignorance.

The Score

Man	Natural Causes
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There can be no real forest conservation while such losses from fire are occurring. Losses must be reduced so that proper growth and development of our forests can take place. The battle will be won only when everyone understands that he has a part to play in protecting our forests.

Every weapon we can bring to bear must be used. School children must work. Parents must work. Organizations for boys and girls, in groups wherever children gather, in the country or in town, must work. We can support such national efforts as the Cooperative Fire Prevention Campaign and National Fire Prevention Week, to see that fire prevention material is distributed.

We must know the few simple rules. We can see that the rules are learned. We can set a personal example and see that our friends abide by the rules. Here they are:

THE FIRE PREVENTION RULES

1. Crush out cigarettes, cigars, pipe ashes—play safe.
2. Break your match in two. When you can hold the burned end between your fingers, you know no fire is left.
3. Drown your campfire; then stir the coals and drown it again.
4. Use ashtrays in cars.

The rules are simple. Let's learn them and practice them.

Throughout this booklet we have emphasized wise use of our natural resources. Perhaps a good, brief definition for conservation is simply *wise use*. That means use for the greatest good to the greatest number in the long run. It means treating our resources so that they will continue to be productive—forever.

Even people who do not have land to manage can practice conservation when they visit the outdoors, by following this code:

THE CODE OF OUTDOOR GOOD MANNERS

I Will—

- drive carefully on streets and highways.
- refrain from defacing trees and signs.
- clean up papers and rubbish.
- keep streams and lakes pure.
- be a good sportsman and observe the laws.
- use care with matches, smoking materials, and campfires—and make sure they are dead out.

I Will Keep Our Forests Green!

Will you pledge yourself to accept this code?

KEY WORDS

Insect damage
Blister rust disease
Prevention of man-caused fires
Conservation

PROBLEMS

1. Give four rules for preventing forest fires.
2. Think back over what you have learned in this booklet. Then name some of the important things our country loses when the forest burns.
3. Repeat the Code of Outdoor Good Manners.

FORESTS HELP PREVENT FLOODS AND WATER SHORTAGES

How does forested land store water? The forest soil is a natural reservoir. On the surface is litter—dead leaves, twigs, and other plant parts. Beneath is litter in the process of decay. Next comes the topsoil, a mineral layer often mixed with organic (plant and animal) matter. The fresh and decaying litter on the surface of the soil, together with the organic matter in the topsoil, is called *humus*. The topsoil is dark-colored, light in weight, loose, and porous. The soil layers beneath are usually heavier and more compact, with less air space between particles.

The soil surface is protected by the mat of litter, and this in turn is protected against drying out or blowing away by the trees, shrubs, weeds, and grass which grow in the forest.

On a good forest soil, the water from rain or melting snow seeps in gently through the litter mat. Then it slowly works its way down through the soil pores, and along root channels and

through insect and animal tunnels. When the soil has absorbed all the water it can hold, the surplus slowly seeps to the underground rock, which is porous enough to hold considerable water. Then it finds its way to springs and creeks. This action is like “filtering” and is known as *infiltration*. For this reason, streams with a good forest cover on their watersheds do not often have bad floods or serious water shortages. Such streams flow clear even after heavy rains or rapid snow melt.



F-399805

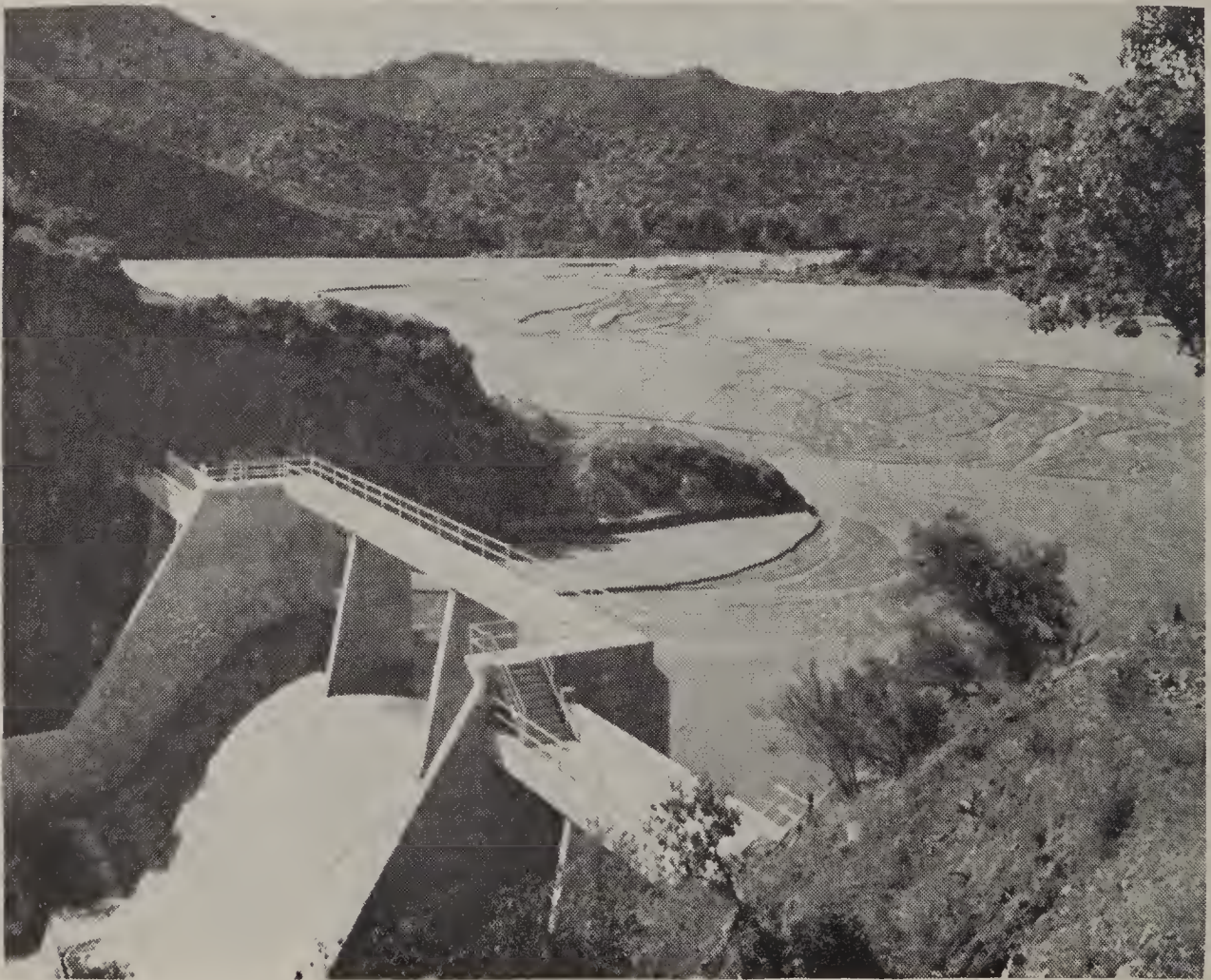
When rain falls on soil without plant cover, it washes the soil away.

But when rain falls on damaged or unprotected forest soil, it does not readily sink into the ground. The raindrops fall directly upon the bare or packed-down soil. They splash the soil particles about. These in turn fill up the pores of the soil at the surface, preventing the water from soaking in. It has to run off on top, carrying soil with it. Such fast-moving muddy

water, called surface runoff, may be very destructive. It is largely responsible for quick flood rises, and may carry large quantities of soil, gravel, and boulders torn from the hillsides or from stream banks.

Sometimes water from natural stream flow is too abundant for those who use it, and sometimes there is not enough. So reservoirs are constructed to catch and store stream flow for release as needed downstream.

Some of our best dams in small streams are made by beavers. They build dams of sticks and mud to form natural reservoirs. Where there are beavers we usually have few floods. Beavers are excellent “water-savers.”



F-417101

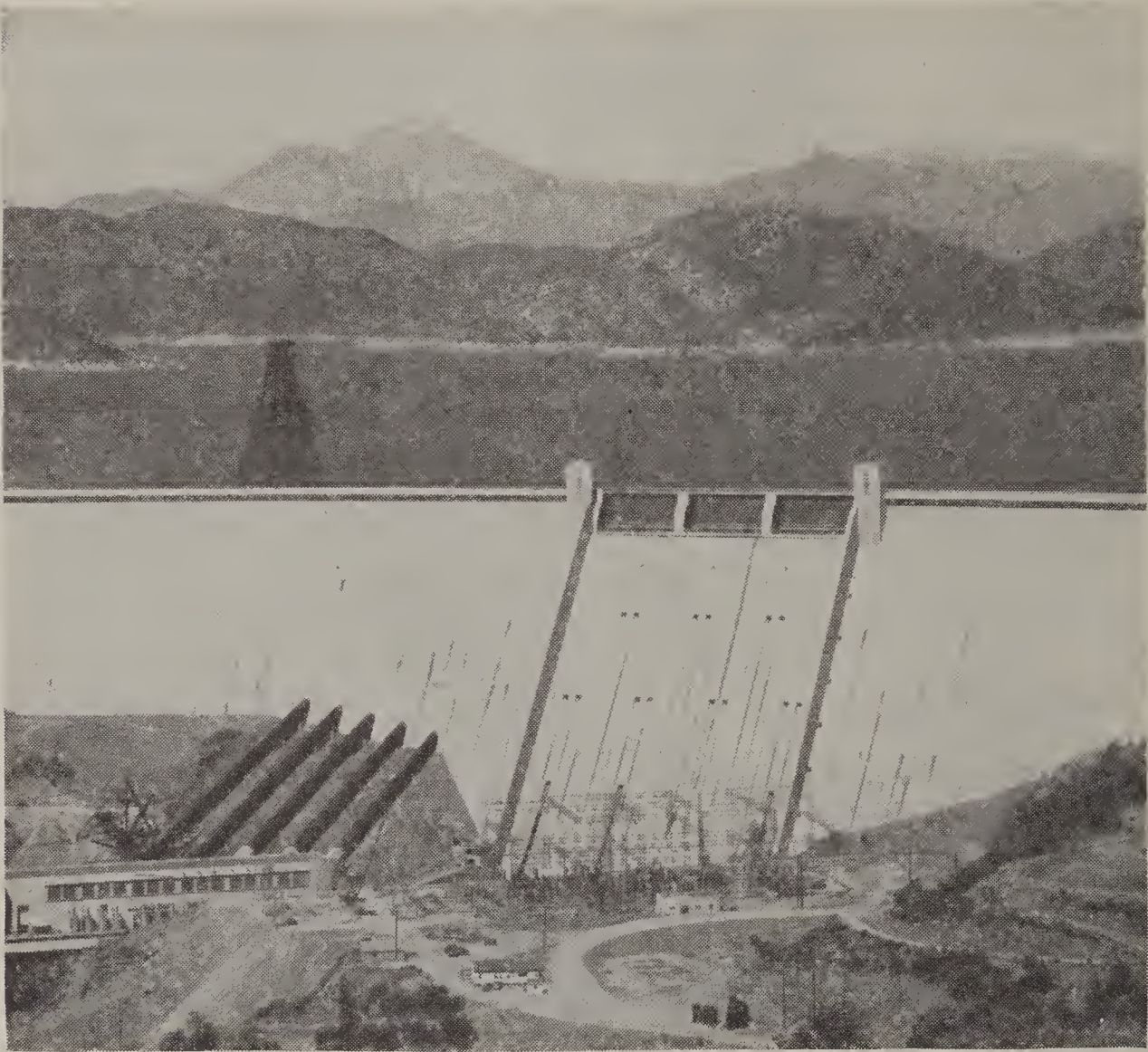
This shows a reservoir filled with silt—the tiny soil particles washed away from upstream lands.

The fine soil carried away in erosion and floods fills up reservoirs with silt, making them useless. It is then usually necessary to construct a new dam, at a cost which may run to millions of dollars.

In recent years destructive floods of the Mississippi and Ohio Rivers have occurred frequently, largely because much of the forest on the headwaters has been destroyed. In the early days the woods were cut and burned to clear the land for homes and farms. As population increased, the forests were pushed farther back, to furnish lumber, railroad ties, and telephone poles. These and other changes on the land paved the way for floods.

Engineering works such as dams, levees, and concrete-lined channels are usually necessary downstream in bad flood areas. Great flood-control projects in California have been constructed in and near Los Angeles and in the lower Sacramento River Valley. Upstream it is necessary to keep out fire, keep down disease and insect damage, and see that use is proper, in order to protect the forest. As long as the forest is there, it will help to store and control water. But the forest can only do its best work when the soil of the forest has been kept in proper condition. Sometimes trees and shrubs are planted and grass is sown to build up the soil cover and slow down the water so that it will not carry away the soil. If the watershed at the head of a stream is in good condition, the need for expensive dams and other structures downstream is much less.

The dam shown in the photograph on page 34 is an example of a structure which holds back surplus water, thus helping to prevent floods. Shasta Lake, the reservoir behind this dam, furnishes water to generate electricity and provides a recreation center. It is one of the units of the great Central Valley Project and furnishes water for irrigation in the Sacramento Valley and, by a canal system, to the San Joaquin Valley as well.



F-448020

Shasta Dam. Mount Shasta in background.

The forest and soil and the rock are a great reservoir which people living in the valleys may draw upon without cost to themselves except for keeping a good cover of plants on the watershed. Our topsoil has made us a rich and powerful country; but muddy water from our fields and mountains can make us a second-rate power. It has happened in China, in the Mediterranean countries, and in Syria, to name a few places that man has ruined. It can happen here.

We must learn to use our natural resources wisely. We cannot afford to continue making the same mistakes over and over. We must renew and restore our soil and forests and grass. We must stop destroying our resources—the only real wealth we

have—only to turn around and spend tremendous sums of money to repair the damage—if that is still possible. As far as forests are concerned:

FOREST CONSERVATION MEANS—

- Stopping fires.
- Preventing erosion on watersheds.
- Reducing waste from careless logging and sawmilling methods.
- Practicing good forestry in removing the timber crop.
- Keeping down losses caused by insects and disease.
- Planting small trees where necessary to help out Mother Nature.
- Providing good living conditions for wild animals, birds, and fish.

KEY WORDS

Humus

Flood control

Infiltration

Silting of a reservoir

PROBLEMS

1. If you have ever seen a flood or damage from a flood, describe it.
2. What is the *delta* of a river? How is it formed? Why is it fertile?
3. Why does forest soil store large amounts of water while bare soil does not?
4. Find out the extent of damage from silting in your local reservoir. How can it be reduced?
5. Examine some humus or forest soil. Describe it.
6. What are the seven points of forest conservation?

REVIEW

Panel Discussion

Select a panel of five composed of a leader, and four members representing these types of forest users: A sportsman, a building contractor using lumber, a cattle raiser, and an irrigation farmer. Have a round-table discussion on the subject "What the National Forests of California Mean to Me."

Test Words

The following are important words—the "keys" to this unit on national forests. They should be clearly understood.

National forest	Infiltration
Topsoil	Flood control
Soil erosion	Fire prevention
Range management	Conservation
Timber crop	

APPENDIX

TEACHING AIDS

Selected References for Teachers

Science in the Elementary School.—Prepared and distributed by the California Department of Education. Pages 168–180 give "desirable outcomes" and references. Has bibliography, teaching ideas.

Science Guide for Elementary Schools.—Published by California Department of Education. Distributed to elementary and junior high schools at time of publication. Pages 281–283 of "Science in the Elementary School," described above, provide a list of the booklets available in the "Science Guide" series.

Forest Service.—United States Department of Agriculture, 630 Sansome Street, San Francisco 11, furnishes teaching material on conservation free of charge. Maps, charts, posters, many in color, film list, and bulletins. Ask for sample teacher's packet. Additional copies of "Know Your National Forests in California" may be obtained from this address.

The Great Forest, by Richard G. Lillard; Knopf, New York, 1947. A history of our forest heritage. Readable and full of information.

Behold Our Green Mansions, by Richard H. D. Boerker; Chapel Hill, University of North Carolina Press, 1945. A book about American forests—management, restoration, uses, enemies, problems.

Teaching Conservation, by Ward Beard; American Forestry Association, Washington, D. C., 1948. A new and useful working tool.

Large Was Our Bounty: Natural Resources and the Schools. 1948 Yearbook of the Association for Supervision and Curriculum Development. National Education Association, 1201 Sixteenth Street, Northwest, Washington, D. C. Objectives and principles of teaching conservation.

Selected References for Older Pupils

Where Rivers Are Born. Published cooperatively by United States Forest Service and California Department of Natural Resources. An illustrated unit on watersheds and the distribution and use of water, written for eighth grade and above. Useful for women's clubs and similar organizations. Available upon request from United States Forest Service, 630 Sansome Street, San Francisco 11, or Division of Forestry, Department of Natural Resources, Sacramento.

Conservation of American Resources, by Charles N. Elliott; Turner E. Smith & Co., Atlanta, 1940. Text or reference for junior high school. Excellent photographs, activities, references. Attractive format.

Conservation and Citizenship, by Renner and Hartley; D. C. Heath & Co., Boston, 1940. For high school pupils, or teachers. Citizenship approach. Good illustrations, activities, format.

Recommended Films (all 16 mm. with sound)

Fifteen motion pictures are available on loan from Forest Service, United States Department of Agriculture, 630 Sansome Street, San Francisco 11. Borrower pays transportation charges both ways. Loan periods limited to 10 days in your possession. Send for descriptive film list. Titles follow:

Everyman's Empire	Richer Range Rewards
Forest Ranger	The River
The Frying Pan and the Fire	Snow Harvest
Guardians of the Wild	Then It Happened
It's No Picnic	There's More Than Timber in Trees
Junior Raindrop	This Is Our Land
Lifeblood of the Land	Tongass Timberland
Realm of the Wild	

Your school library may have these films. Or try University Extension Division, either University of California, 2441 Bancroft Way, Berkeley, or U. C. L. A., 405 Hilgard Avenue, Los Angeles.

Transcription Series

A series of twelve 15-minute transcriptions for use on 33 $\frac{1}{3}$ r. p. m. record players, titled *Bill Scott—Forest Ranger*, teaches forest conservation by dramatization. May be purchased practically at cost. Can be obtained on loan for 1-month trial period from Forest Service, 630 Sansome Street, San Francisco 11. *Teacher's Guide*, prepared for California, is available. Youngsters are the principal characters in these adventures. Evaluated as suitable for grades five to eight inclusive. Approved by California Department of Education. Titles follow:

Lost in the Forest	Wind in the Night
Crashing Timber	Old MacDonald Had Some Woods
Storm Over the Forest	Flash Flood in Devil's Run
Singing Saws	Killer on the Loose
Where, Oh, Where, is Smokey Bear?	Wings Over the Forest
Forest Aflame	Landslide



National Forests of the United States.

IMPORTANT TREES OF CALIFORNIA

Commercially important trees

Ponderosa pine (*Pinus ponderosa*).
Redwood (*Sequoia sempervirens*).
Douglas-fir (*Pseudotsuga taxifolia*).
White fir (*Abies concolor*).
California red fir (*Abies magnifica*).
Sugar pine (*Pinus lambertiana*).
California incense-cedar (*Libocedrus decurrens*).
Sitka spruce (*Picea sitchensis*).
Port-Orford-cedar (*Chamaecyparis lawsoniana*).

Other important trees

Conifers:

Digger pine (*Pinus sabiniana*).
Lodgepole pine (*P. contorta* var. *latifolia*).
Western white pine (*P. monticola*).
Monterey pine (*P. radiata*).
Knobcone pine (*P. attenuata*).
Giant sequoia (*Sequoia gigantea*).
Junipers (mainly *Juniperus californica* and *J. occidentalis*).

Hardwoods:

Red alder (*Alnus rubra*).
Pacific madrone (*Arbutus menziesii*).
Fremont cottonwood (*Populus fremontii*).
California black oak (*Quercus kelloggii*).
California scrub oak (*Q. dumosa*).
Canyon live oak (*Q. chrysolepis*).
California live oak (*Q. agrifolia*).
California sycamore (*Platanus racemosa*).

Others of interest

Quaking aspen (*Populus tremuloides*).

Joshua-tree (*Yucca brevifolia*).

Bigleaf maple (*Acer macrophyllum*).

Monterey cypress (*Cupressus macrocarpa*).

**PUBLIC AGENCIES ADMINISTERING FORESTS
AND PARKS IN CALIFORNIA**
FEDERAL

Forest Service, Department of Agriculture:	National Park Service, Depart- ment of the Interior:
18 national forests.	4 national parks.
19¼ million acres.	8 national monuments.
Administers national forests for production of timber and forage.	1¾ million acres.
Water, fish and wildlife, and rec- reation are managed for the pub- lic benefit.	Administers national parks and monuments of scenic beauty, his- toric value, and scientific interest for the enjoyment of visitors.
Timber is sold, and cattle and sheep are allowed to graze the forage crop.	Manages fish, wildlife and water production for public benefit. Timber cutting or grazing not permitted.

STATE

Department of Natural Resources

Division of Forestry:	Division of Beaches and Parks:
6 forestry districts.	88 State parks, beaches and monuments.
60,000 acres of State forest (24 million acres of privately owned land protected).	500,000 acres.
Protects privately owned and county forest land from fire, and from damage by insects and dis- ease.	Administers 88 parks, beaches, and monuments of scenic beauty, historic value or scientific interest for the enjoyment of the public.
Administers State forests.	These lands are owned by the State. Many of them were orig- inally purchased by the State pay- ing half and local governments, organizations, or individuals pay- ing the other half.
Administers forest practices law of 1945, which provides that the logging industry regulate itself for protection, reforestation, and proper cutting.	

WILDERNESS AREAS

(See p. 4 for location of national forests)

Wilderness area:

Agua Tibia
Caribou Peak
Cucamonga
Desolation Valley
Devil Canyon-Bear Canyon
Emigrant Basin
High Sierra
Marble Mountains
Middle Eel-Yolla Bolly
Mount Dana-Minarets
Salmon-Trinity Alps
San Gorgonio
San Jacinto
San Rafael
South Warner
Thousand Lake Valley
Ventana

National forest:

Cleveland
Lassen
San Bernardino
Eldorado
Angeles
Stanislaus
Inyo, Sierra
Klamath
Mendocino, Trinity
Sierra
Klamath, Shasta, Trinity
San Bernardino
San Bernardino
Los Padres
Modoc
Lassen
Los Padres

